

1. Work requester fills out this section.

☐ Standing Work Permit

Requester: Don Lynch	Date: 6/4/07	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Carter Biggs			Ext.: 7515
Work Control Coordinator: Don Lynch		Start Date: 6/6/07	Est. End Date: 6/29/07
Brief Description of Work: MuTr Chip Capacitor removal			
Building: 1008	Room: IR	Equipment: MuTr North & South	Service Provider: PHENIX techs & MuTr experts

WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis

ES&H ANALYSIS					
Radiation Concerns		<input checked="" type="checkbox"/> None	<input type="checkbox"/> Activation	<input type="checkbox"/> Airborne	<input type="checkbox"/> Contamination
Radiation Generating Devices:		<input type="checkbox"/> Radiography	<input type="checkbox"/> Moisture Density Gauges	<input type="checkbox"/> Soil Density Gauges	<input type="checkbox"/> X-ray Equipment
<input type="checkbox"/> Special nuclear materials involved, notify Isotope Special Materials Group			<input type="checkbox"/> Fissionable materials involved, notify Laboratory Criticality Officer		
Safety Concerns		<input checked="" type="checkbox"/> None	<input type="checkbox"/> Ergonomics	<input type="checkbox"/> Transport of Haz/Rad Material	
<input type="checkbox"/> Adding/Removing Walls or Roofs	<input checked="" type="checkbox"/> Confined Space*	<input type="checkbox"/> Explosives	<input type="checkbox"/> Lead*	<input type="checkbox"/> Penetrating Fire Walls	
<input type="checkbox"/> Asbestos*	<input type="checkbox"/> Corrosive	<input type="checkbox"/> Flammable	<input type="checkbox"/> Magnetic Field*	<input type="checkbox"/> Pressurized Systems	
<input type="checkbox"/> Beryllium*	<input type="checkbox"/> Cryogenic	<input type="checkbox"/> Fumes/Mist/Dust*	<input type="checkbox"/> Material Handling	<input type="checkbox"/> Rigging/Critical Lift	
<input type="checkbox"/> Biohazard*	<input type="checkbox"/> Electrical	<input type="checkbox"/> Heat/Cold Stress	<input type="checkbox"/> Noise*	<input type="checkbox"/> Toxic Materials*	
<input type="checkbox"/> Chemicals*	<input type="checkbox"/> Elevated Work*	<input type="checkbox"/> Hydraulic	<input type="checkbox"/> Non-ionizing Radiation*	<input type="checkbox"/> Vacuum	
<input type="checkbox"/> Excavation	<input type="checkbox"/> Lasers*	<input type="checkbox"/> Oxygen Deficiency*	<input checked="" type="checkbox"/> Other		
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Environmental Concerns		<input checked="" type="checkbox"/> None	<input type="checkbox"/> Work impacts Environmental Permit No.		
<input type="checkbox"/> Atmospheric Discharges (rad/non-rad)	<input type="checkbox"/> Land Use	<input type="checkbox"/> Soil Activation/contamination	<input type="checkbox"/> Waste-Mixed		
<input type="checkbox"/> Chemical or Rad Material Storage or Use	<input type="checkbox"/> Liquid Discharges	<input type="checkbox"/> Waste-Clean	<input type="checkbox"/> Waste-Radioactive		
<input type="checkbox"/> Cesspools (UIC)	<input type="checkbox"/> Oil/PCB Management	<input type="checkbox"/> Waste-Hazardous	<input type="checkbox"/> Waste-Regulated Medical		
<input type="checkbox"/> High water/power consumption	<input type="checkbox"/> Spill potential	<input type="checkbox"/> Waste-Industrial	<input type="checkbox"/> Underground Duct/Piping		
Waste disposition by:		<input type="checkbox"/> Other			
Pollution Prevention (P2)/Waste Minimization Opportunity:		<input checked="" type="checkbox"/> None <input type="checkbox"/> Yes			
FACILITY CONCERNS		<input checked="" type="checkbox"/> None			
<input type="checkbox"/> Access/Egress Limitations	<input type="checkbox"/> Electrical Noise	<input type="checkbox"/> Potential to Cause a False Alarm		<input type="checkbox"/> Vibrations	
<input type="checkbox"/> Configuration Control	<input type="checkbox"/> Impacts Facility Use Agreement	<input type="checkbox"/> Temperature Change		<input type="checkbox"/> Other	
<input type="checkbox"/> Maintenance Work on Ventilation Systems	<input type="checkbox"/> Utility Interruptions				
WORK CONTROLS					
Work Practices					
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Exhaust Ventilation	<input checked="" type="checkbox"/> Lockout/Tagout	<input type="checkbox"/> Spill Containment	<input type="checkbox"/> Security (see Instruction Sheet)	
<input checked="" type="checkbox"/> Back-up Person/Watch	<input type="checkbox"/> HP Coverage	<input type="checkbox"/> Posting/Warning Signs	<input type="checkbox"/> Time Limitation	<input type="checkbox"/> Other	
<input type="checkbox"/> Barricades	<input type="checkbox"/> IH Survey	<input type="checkbox"/> Scaffolding-requires inspection	<input type="checkbox"/> Warning Alarm (i.e. "high level")		
Protective Equipment					
<input type="checkbox"/> None	<input type="checkbox"/> Ear Plugs	<input type="checkbox"/> Gloves	<input type="checkbox"/> Lab Coat	<input checked="" type="checkbox"/> Safety Glasses	
<input type="checkbox"/> Coveralls	<input type="checkbox"/> Ear Muffs	<input type="checkbox"/> Goggles	<input type="checkbox"/> Respirator	<input type="checkbox"/> Safety Harness	
<input type="checkbox"/> Disposable Clothing	<input type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Hard Hat	<input type="checkbox"/> Shoe Covers	<input checked="" type="checkbox"/> Safety Shoes	<input type="checkbox"/> Other
Permits Required (Permits must be valid when job is scheduled.)					
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Cutting/Welding	<input type="checkbox"/> Impair Fire Protection Systems			
<input type="checkbox"/> Concrete/Masonry Penetration	<input type="checkbox"/> Digging/Core Drilling	<input type="checkbox"/> Rad Work Permit-RWP No			
<input checked="" type="checkbox"/> Confined Space Entry	<input type="checkbox"/> Electrical Working Hot	<input type="checkbox"/> Other			
Dosimetry/Monitoring					
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Heat Stress Monitor	<input type="checkbox"/> Real Time Monitor	<input type="checkbox"/> TLD		
<input type="checkbox"/> Air Effluent	<input type="checkbox"/> Noise Survey/Dosimeter	<input type="checkbox"/> Self-reading Pencil Dosimeter	<input type="checkbox"/> Waste Characterization		
<input type="checkbox"/> Ground Water	<input type="checkbox"/> O ₂ /Combustible Gas	<input type="checkbox"/> Self-reading Digital Dosimeter	<input checked="" type="checkbox"/> Other Check O ₂ level prior to entry		
<input type="checkbox"/> Liquid Effluent	<input type="checkbox"/> Passive Vapor Monitor	<input type="checkbox"/> Sorbent Tube/Filter Pump			
Training Requirements (List below specific training requirements)					
Confined Space, CA –Collider User, PHENIX Awareness					
Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:			If using the permit when all hazard ratings are low, only the following need to sign: (Although allowed, there is no need to use back of form)		
ES&H Risk Level:	<input checked="" type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High	WCC:	Date:
Complexity Level:	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	Service Provider:	Date:
Work Coordination:	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	Authorization to start	Date:
(Departmental Sup/WCC/Designee)					

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, and personnel availability need to be addressed): See Attached backup Documentation				
Special Working Conditions Required: None				
Operational Limits Imposed: Modification work limited to lower octants easily reachable when standing on lower magnet superstructure.				
Post Work Testing Required: No				
Job Safety Analysis Required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Walkdown Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Reviewed by: Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.				
Title	Name (print)	Signature	Life #	Date
Primary Reviewer				
ES&H Professional				
Other				
Other C. Pearson				
Work Control Coordinator	Don Lynch		20146	4/18/07
Service Provider				
	Review Done: <input type="checkbox"/> in series <input type="checkbox"/> team			

4. Job site personnel fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).			
Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:
Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.			

5. Departmental Job Supervisor, Work Control Coordinator/Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)			
Name:	Signature:	Life#:	Date:

6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required. ☐ Yes ☐ No

Post Job Review (Fill in names of reviewers)			
Name:	Signature:	Life#:	Date:
Name:	Signature:	Life#:	Date:

7. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)	
a) WCM/WCC: Is any feedback required? <input type="checkbox"/> Yes <input type="checkbox"/> No	
b) Workers: Are there better methods or safer ways to perform this job in the future? <input type="checkbox"/> Yes <input type="checkbox"/> No	

8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)

Name:	Signature:	Life#:	Date:
Comments:			

MuTr Chip Capacitor removal**INTRODUCTION**

The PHENIX MuTr experts have developed a new technique to safely remove high-voltage surface mount chip capacitors, from anode wire circuit cards - that are a part of the station 3 tracking chambers - mounted to the back wall of the north and south muon magnets. Station 3 North has 10 anode cards per wire plane, 9 cards have 32 capacitors, one card has 29 caps (remaining wires used for calibration pulses). $9 \times 32 + 29 = 317$ (2 wire planes per chamber, 8 chambers) capacitors in Station 3 North.

The process involves the use of a modified 30 watt soldering iron that has a custom tip attached (see attached photos). The soldering iron tip slips over the HV-cap, once heat is applied the capacitor becomes loose and can be easily removed. Only capacitors in octants which are accessible without internal scaffolding, ladders or other supplemental means (i.e. only capacitors which can be easily reached when standing on the base super structure) will be removed under this permit. (Note: during future maintenance shutdowns access to capacitors using scaffolding or other structural means of safe working at heights within the north and south muon magnets are likely to be utilized to perform similar tasks. These efforts shall be defined and planned separately and documented under a separate work permit.)

MMN MuTr Capacitor Removal Procedure

The following operations will take place during a **restricted access** period for designated for experimental access to the PHENIX IR. It is estimated that the entire procedure will take less than 8 hours.

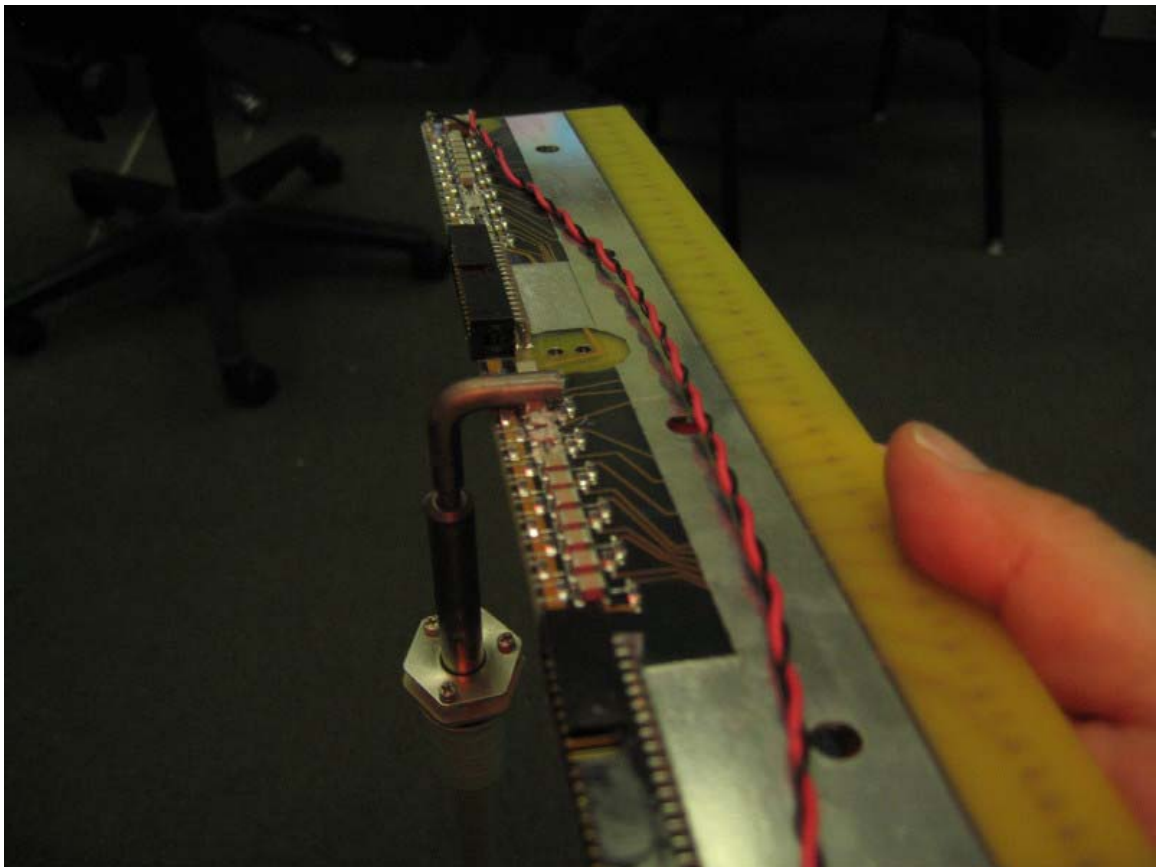
1. Prior to any IR entry, all PHENIX magnets will be ramped down and locked out. ***PHENIX WCC will apply lock to PHENIX lock box. MMN Power supply will be LOTO'd by C-A***
2. Prior to entry into the MMN C-A safety shall be contacted, when he arrives to sample the internal MMN atmosphere, the sliding access panel shall be opened to permit sampling and an O2 content of the MMN internal atmosphere shall be sampled and recorded on the attached sheet.
3. The C-A confined space safety expert shall determine from the tests whether it is safe to enter the MMN for the purposes stated herein. ***In no event shall anyone enter the MMN prior to approval of the C-A confined space monitoring expert.***
4. After clearance to enter has been, properly trained MuTr experts and/or properly trained PHENIX technicians shall sign the entry log sheet (attached) and may then enter and perform the capacitor removal technique test on a limited number of the capacitors as determined by the MuTr experts.

5. During the task HV to the MuTr detector panels will be turned on and off so that the MuTr expert can use a multimeter to detect DC current leaking through the chip capacitors to ground and remove some of the capacitors found to be leaking as described below:

For the MuTr North detector panels, one high voltage line out of an eight channel module feeds "x" number of anode plane circuit cards. In station 3 North there are 10 cards in each of two anode planes. Each card has two multi-pin anode connectors on it - they were designed to enable readout of pulses on anode wires. This connector is coupled through a high voltage chip capacitor on this board. The procedure is to connect a cable to this multi-pin connector and look for DC voltage leaking through the capacitor to ground. The low levels of current being seen on the monitor in the control room are of the order of 10 - 50 micro amps at 1,800 volts. With the mating connector made up there are 16 channels that can be looked at with the use of a multi-meter and the channel that has a small DC voltage leaking through is found.

Next step is to remove the corresponding capacitor. Turn off the high voltage. Using the special soldering pencil, place it over a capacitor let it heat up for about 15 - 20 seconds - you should be able to feel it becoming loose from the circuit board - remove the capacitor. Turn the high voltage back on and monitor the current. If the current has returned to a normal level you have found the bad capacitor. Turn off the high voltage. Use a transfer pipet to spread a small amount of conformal coating over the area where the capacitor once was.

6. After completion of the tasks all equipment brought into the MMN shall be removed and the MMN access panel closed.



CONFINED SPACE ENTRY CERTIFICATION

Location Building 1008, IR, Muon Magnet North (MMN)		Date
Department PO	Division PHENIX	
Building 1008	Area/Location/Room: IR, MMN	
Supervisor/Designee Don Lynch/Carter Biggs		Life # 20146/15639

PRE-ENTRY QUESTIONS

For each item, check "yes" or "no": If no, consult Supervisor

	YES	NO
Is entry essential to perform work?	<input type="checkbox"/>	<input type="checkbox"/>
Have all personnel been trained in confined space entry?	<input type="checkbox"/>	<input type="checkbox"/>
Are conditions safe to remove utility-hole cover?	<input type="checkbox"/>	<input type="checkbox"/>
Has opening been guarded?	<input type="checkbox"/>	<input type="checkbox"/>
Is monitoring equipment calibrated?	<input type="checkbox"/>	<input type="checkbox"/>
Has monitoring been performed and recorded below?	<input type="checkbox"/>	<input type="checkbox"/>
Is GFCI used, if outside or in wet conditions?	<input type="checkbox"/>	<input type="checkbox"/>
Is ventilation blown into bottom of space? (If required)	<input type="checkbox"/>	<input type="checkbox"/>
Are personnel instructed to evacuate upon hazard detection?	<input type="checkbox"/>	<input type="checkbox"/>
Have all workers reviewed these entry requirements?	<input type="checkbox"/>	<input type="checkbox"/>
Radiation: If present, RWP may be required – review work with ESH Coordinator and RCD personnel. Evaluate hazards and controls.	<input type="checkbox"/> Reviewed	<input type="checkbox"/>

SPACE CLASSIFICATION QUESTIONS

For each item, check box only if "yes"

	Class 2A	Class 2B	Class 2C
Engulfment Hazard Present			<input type="checkbox"/>
Entrapment Hazard Present			<input type="checkbox"/>
Electrical Systems:			
• Deenergized	<input type="checkbox"/>		
• Energized and Working Hot			<input type="checkbox"/>
• Energized, but Guarded or not Working Hot	<input type="checkbox"/>		
Mechanical Systems:	n/a		
• Deenergized	<input type="checkbox"/>		
• Energized and Working Hot			<input type="checkbox"/>
• Energized but Guarded or not Working Hot	<input type="checkbox"/>		
Other Energized Systems: (e.g., steam, sewage)	n/a		
• Deenergized	<input type="checkbox"/>		
• Energized and Working Hot			<input type="checkbox"/>
• Energized but Guarded or not Working Hot	<input type="checkbox"/>		
Chemical Hazards inherent in space, based upon monitoring, but controllable by Ventilating - Monitor for O₂ prior to entry		<input type="checkbox"/>	
Chemical Hazards inherent in space, based upon monitoring, but not controllable by ventilating	n/a		<input type="checkbox"/>
Chemical Sources, introduced into space? (e.g., welding fumes, solvents)	n/a		<input type="checkbox"/>
High Temperature/Pressure Hazard? (other than steam utility-holes)	n/a		<input type="checkbox"/>
<ul style="list-style-type: none"> If ANY box in column 2C is checked, a Confined Space Permit IS required. If any box in column 2B is checked, and none in column 2C, a Confined Space Permit IS NOT required BUT continuous monitoring and ventilating ARE required. If only boxes in column 2A are checked, no additional requirements apply. 			

Classification evaluation

CLASSIFICATION <div style="font-size: 2em; font-weight: bold;">CLASS:2A</div>	I have completed the front and back of this Confined Space Entry Certification form and classified this space. If the confined space is classified as a 2C, I will obtain a Confined Space entry permit. If the space is Class 2B, continuous monitoring and ventilation is required and will be documented on this form.	
	Supervisor/Designee:	Life # Date:

BNL CONFINED SPACE ENTRY CERTIFICATION

Meter:	Serial #	Calibration Date:
Day of Use Sensor Check <input type="checkbox"/> Yes <input type="checkbox"/> No		
Tested By:	BNL#:	

MONITORING RESULTS

Tested By:		BNL Number:			
Date/ Time	Oxygen % (% O ₂)	Flammable Gas (% LEL)	Carbon Monoxide (CO ppm)	Hydrogen Sulfide (H ₂ S ppm)	Other:
Pre-Entry Certification test					
Acceptable Reading	19.5 – 23.5 %	< 10 % of LEL	<25 ppm	<10 ppm	

Supplemental sampling record

CLASS 2B CONFINED SPACE ENTRY CERTIFICATION

For Class2B spaces, continuous monitoring is required.

MONITORING RESULTS

Tested By:		BNL Number:			
Date/ Time	Oxygen % (% O ₂)	Flammable Gas (% LEL)	Carbon Monoxide (CO ppm)	Hydrogen Sulfide (H ₂ S ppm)	Other:
Acceptable Reading	19.5 – 23.5 %	< 10 % of LEL	25 ppm	10 ppm	

Class 2B: Describe Method of Ventilation:

Muon Magnet Confined Space Entry Certification Sheet

*The undersigned certify that they have taken the BNL Confined Space Training, BNL Course # **HP-OSH-016**, within the last twenty four months, and understand the hazards involved in working in the south and north muon magnets (**MMS and MMN**).*

[illegible]